REMARKS

In the Specification

A substitute specification, in marked up and clean formats, is enclosed herein. In the substitute specification, a number of informalities have been corrected and the use of American idiomatic English has been introduced.

It is believed that the amendments to the specification and claims introduce no new matter.

In the Claims

Claims 72-142 are pending in the application. In the present amendment, claims 72, 81, 82, 91, 93, 99-101, 106, 108, 115, 117, 118, 121, 127-131, 134, 136, 138, 140 and 141 have been amended. Entry of the present amendment and reconsideration of the present application are respectfully requested.

A. The Claim Objections

Claims 72, 82, 89, 108, 117, and 131 have been objected to. It is believed that the present amendments to those claims remove such grounds for objection. In addition, claims 72, 81, 91, 93, 99-101, 106, 108, 115, 117, 118, 121, 127-131, 134, 136, 138, 140 and 141 have been amended to point out the invention with greater clarity and/or remove informalities.

B. The Claim Rejections

Claims 72-93, 96-97 and 117-142 have been rejected under 35 USC 103(a) over Agrafiotis et al., US 2002/0091655, now US 7,039,621 in view of Shmulevich et al., US 2003/0225718, now US 7,257,563.

Claims 94-95 have been rejected under 35 USC 103(a) over Agrafiotis in view of Shmulevich and further in view of Granger, US 6,463,321.

Claims 98-106 have been rejected under 35 USC 103(a) over Agrafiotis in view of Shmulevich and further in view of Schipper, US 5,581,259.

Claims 107-116 have been rejected under 35 USC 103(a) over Agrafiotis in view of Shmulevich and further in view of Blaney et al., US 5,680,331.

These rejections are respectfully traversed at least for the following reasons.

The primary reference Agrafiotis teaches a method for mapping n-dimensional input patterns into a m-dimensional space so as to preserve relationships that may exist in the n-dimensional space. The method is rooted on the principle of probability sampling, i.e. the notion that a small number of randomly chosen members of a given population will tend to have the same characteristics, and in the same proportion, as the population as a whole. Such approach employs an iterative algorithm based on subset refinements to nonlinearly map a small random sample which reflects the overall structure of the data, and then "learns" the underlying nonlinear transform using a set of distributed neural networks, each specializing in a particular domain of the feature space. The partitioning of the data space can be carried out using a clustering methodology. See, e.g. Agrafiotis at the Abstract and paragraph [0042].

Regarding claim 72, the Office Action has cited paragraphs [0026], [0050]-[0053], [0090], [0096]-[0097], [0110], [0117] and [0119] of Agrafiotis as particularly relevant. These paragraphs essentially relate to an embodiment, which is based on local learning and in which the space R^n is partitioned into a set of Voronoi polyhedra and a separate "local" network is used to project the patterns in each partition.

In particular, the Voronoi cells partition the input data space R^n into local regions "centered" at reference points P. Once local networks are trained, patterns from the input set of patterns can be mapped into space R^m using the method illustrated in FIG.6 of Agrafiotis. The distance of the input pattern x to each reference point is determined, and the point C_j that is nearest to the input pattern x is identified. The pattern x is then mapped to a point y in R^m, using the local neural network Net_j^L. See, e.g., Agrafiotis at paragraphs [0093], [0094] and [0109].

Among other things, the cited method of Agrafiotis does not teach “calculating a matrix of distances between each record in the database using said metric function” because Agrafiotis teaches instead portioning the R_n space in Voronoi polyhedral and expressly describes his method as <u>not</u> using a global network, teaching away from Applicant’s invention.

The cited method of Agrafiotis also does not teach “calculating the N-1 coordinates of each record in the N-1 dimensional space using an evolutionary algorithm” and “wherein in said evolutionary algorithm a number of marriages and of mutations of individuals are adaptive self-definable internal variables” because Agrafiotis teaches the use of an iterative nonlinear mapping algorithm and not of an evolutionary algorithm as claimed by Applicant.

Further, the cited method of Agrafiotis also does not teach “defining a best projection of the records onto the N-1 dimensional space as a projection in which a distance matrix of the

records in the N-1 dimensional space best fits or has minimum differences with the distance matrix of the records calculated in the N-dimensional space" because Agrafiotis is not understood to teach the use of distance matrices.

In fact, it is submitted that the regions and points defined through the Agrafiotis method might be subsequently mapped using Applicant's method, making the two methods complementary. See, for example, the discussion at paragraph [0075] of the published application related to application of the claimed method to data clusters.

The secondary reference Shmulevich fails to fill the deficiencies of Agrafiotis.

Shmulevich teaches a probabilistic Boolean network. In particular, Shmulevich teaches methods to identify relatively small sub-networks out of a large network, which function more of less independently of the rest of the network. The method of Shmulevich starts with "seeds" consisting of one or more genes, and "grows" iteratively sub-networks from seeds. See, e.g. Shmulevich at paragraphs [0062]-[0063].

It is respectfully submitted that Shmulevich does not teach "calculating a matrix of distances between each record in the database using said metric function" because this limitation is not even discussed in Shmulevich.

Shmulevich also does not teach: "calculating the N-1 coordinates of each record in the N-1 dimensional space using an evolutionary algorithm" and "wherein in said evolutionary algorithm a number of marriages and of mutations of individuals are adaptive self-definable internal variables" because Shmulevich does not teach marriages (among other things) but only mutations that are random in nature, as the Office Action has recognized.

Finally, no reason could be found in the Office Action as to why a combination of Agrafiotis and Shmulevich would have been obvious, other than "the purpose of modeling of complex systems … utilizing methods that model the potential effect of individual genes on the global dynamic network behavior." "This analysis should be made explicit, and it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Ex parte Wynn*, 2008-5632 (BPAI 2009) (citing *KSR Int'l v. Teleflex*, 550 US 398 (2007)). Here, no specific reason could be fund in the Office Action as to why a person skilled in the art at the time of Applicant's invention, reading Agrafiotis, would have found it desirable to replace the iterative nonlinear mapping algorithm of Agrafiotis with the probabilistic Boolean network of Shmulevich to model a complex system, and which deficiencies of Agrafiotis would have been overcome therewith.

In summary, the proposed combination of Agrafiotis and Shmulevich does not teach all

the limitations of claim 72. Moreover, no prima facie case could be found as to why such a combination, even if possible, would have been made.

Regarding independent claims 82, 99, 108, 117 and 131 and the dependent claims, it is submitted that these claims are patentable over the cited references for the same reasons as claim 72 and for the additional limitations contained therein. In particular, the deficiencies of Agrafiotis and Shmulevich are not filled by Granger, Schipper and Blaney.

Conclusion

It is believed that all objections and rejections in the application have been addressed and that the application is in condition for allowance. A notice to that effect is respectfully requested.

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Respectfully submitted,

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